考生注意: 1. 依次序作答，只要標明題號，不必抄題。
2. 答案必須寫在答案卷上，否則不予計分，並限以藍黑色筆作答。
3. 試題隨卷繳回。(餘請詳閱試場規則)

(1) Fig. 1 shows a cross section of a long thin ribbon of width w carrying an uniformly distributed total current i which is running into the page. Calculate the magnitude and direction of the magnitude field $\vec{B}$ at a point P in the plane of the ribbon at a distance d from its edge. (20 points)

(2) In Fig. 2, $\xi = 200\ V$, R_1=10 Ω, R_2=20 Ω, R_3=30 Ω, and L=0.2 H.

Find the values of i_1 and i_2

(a) immediately after the closing of switch S, and then

(b) a long time after that, and then

(c) immediately after the reopening of switch S, and finally

(d) a long time after the reopening. (20 points)

(3) A floating ice block is pushed through a displacement $\vec{d} = (15m)\hat{i} - (12m)\hat{j}$ along a straight embankment by rushing water, which exerts a force $\vec{F} = (210N)\hat{i} - (150N)\hat{j}$ on the block. How much work does the force do on the block during the displacement? (20 points)

(4) (a) Explain the zeroth, the first and the second laws of Thermodynamics. (15 points)
(b) Explain the simple harmonic motion (SHM). (5 points)
(c) Explain the photoelectric effect. (5 points)
(d) Explain the Compton's effect. (5 points)
(e) Explain the de Broglie's matter wave. (5points)
(f) Explain the Bohr's atomic model of Hydrogen. (5points)

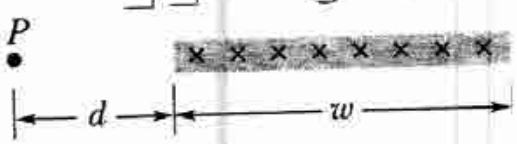

Fig. 1

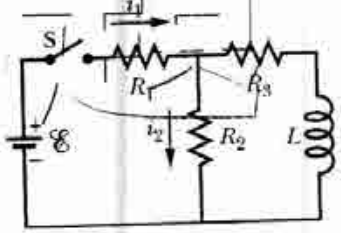

Fig. 2